

ABSTRACT OF THE INVENTION

Disclosed are methods and related compositions for altering the physical and chemical properties of a substrate used in hydrocarbon exploitation, such as in downhole drilling operations. In a preferred embodiment a method involves formulating a fluid, tailored to the specific drilling conditions, that contains one or more inactivated enzymes. Preferably the enzyme is inactivated by encapsulation in a pH responsive material. After the fluid has been introduced into the well bore, one or more triggering signals, such as a change in pH, is applied to the fluid that will activate or reactivate the inactivated enzyme, preferably by causing it to be released by the encapsulation material. The reactivated enzyme is capable of selectively acting upon a substrate located downhole to bring about the desired change in the chemical or physical properties of the substrate.